



## Short-Term Energy and Summer Fuels Outlook

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### Highlights

- West Texas Intermediate (WTI) crude oil spot prices averaged \$89 per barrel in February and \$103 per barrel in March. The WTI price has continued to rise in recent days, reaching \$112 on April 8. Crude oil prices are currently at their highest level since 2008. EIA expects oil markets to continue to tighten over the next two years given expected robust growth in world oil demand and slow growth in supply from non-Organization of the Petroleum Exporting Countries (non-OPEC) countries. These conditions result in an expected drawdown of global petroleum stocks and a call for increasing production from OPEC member countries, which will reduce surplus crude oil production capacity at a time when the disruption of crude oil exports from Libya and continuing unrest in other Middle East and North African (MENA) countries already highlight significant supply risks. Projected WTI prices average \$106 in 2011 and \$114 per barrel in 2012, increases of \$5 per barrel and \$9 per barrel, respectively, from last month's *Outlook*.
- The rise in crude oil prices is reflected in higher petroleum product prices. EIA projects that the retail price of regular-grade motor gasoline will average \$3.86 per gallon during this summer's driving season (the period between April 1 and September 30), up from \$2.76 per gallon last summer. EIA forecasts the annual average regular retail gasoline price will increase from \$2.78 per gallon in 2010 to \$3.70 per gallon in 2011 and to \$3.80 per gallon in 2012. Current market prices of futures and options contracts for gasoline suggest a 33-percent probability that the national monthly average retail price for regular gasoline could exceed \$4.00 per gallon during July 2011.
- Natural gas working inventories ended March 2011 at 1.6 trillion cubic feet (Tcf), slightly below the 2010 end-of-March level. EIA expects that working gas inventories will remain relatively high throughout 2011. The projected Henry Hub natural gas spot price averages \$4.10 per million Btu (MMBtu) in 2011, \$0.29 per MMBtu lower than the 2010 average. EIA expects the natural gas

market to begin to tighten in 2012, with the Henry Hub spot price increasing to an average of \$4.55 per MMBtu.

## **Global Crude Oil and Liquid Fuels**

**Crude Oil and Liquid Fuels Overview.** The forecast for total world oil consumption grows by an annual average of 1.5 million bbl/d in 2011 and 2012. Supply from non-Organization of the Petroleum Exporting Countries (non-OPEC) countries grows an average of about 0.4 million bbl/d annually through 2012. Consequently, EIA expects that in order to meet projected demand growth the market will rely on both a drawdown of inventories and significant increases in the production of crude oil and non-crude liquids in OPEC member countries at a time when the disruption of crude oil exports from Libya and continuing unrest in other MENA countries already highlight significant supply risks.

Among the major uncertainties that could push oil prices above or below our current forecast are: the continued unrest in producing countries and its potential impact on supply; decisions by key OPEC member countries regarding their production response to the global increase in oil demand; the rate of economic growth, both domestically and globally; fiscal issues facing national and sub-national governments; and China's efforts to address concerns regarding its growth and inflation rates.

**Global Crude Oil and Liquid Fuels Consumption.** World crude oil and liquid fuels consumption grew by an estimated 2.3 million bbl/d in 2010 to a record-high level of 86.7 million bbl/d. EIA expects that world liquid fuels consumption will grow by 1.5 million bbl/d in 2011 and by an additional 1.6 million bbl/d in 2012 ([World Liquid Fuels Consumption Chart](#)). Countries outside the Organization for Economic Cooperation and Development (OECD) will make up almost all of the growth in consumption over the next two years, with the largest increases coming from China, Brazil, and the Middle East. EIA expects that, among the OECD regions, only North America will show growth in oil consumption over the next two years, offsetting declines in OECD Europe and Japan.

**Non-OPEC Supply.** EIA projects that non-OPEC crude oil and liquid fuels production will increase by 550,000 bbl/d in 2011, and 230,000 bbl/d in 2012 ([Non-OPEC Crude Oil and Liquid Fuels Production Growth Chart](#)). The greatest increases in non-OPEC oil production during 2011 occur in China, Brazil, and in countries that were formerly part of the Soviet Union where EIA expects annual average production growth of 140,000 bbl/d, 170,000 bbl/d, and 270,000 bbl/d, respectively. In 2012, EIA expects Canadian production to grow by 180,000 bbl/d while China and Brazil grow by 140,000 and 110,000 bbl/d, respectively. Other non-OPEC areas are expected to

decline, including a decrease in North Sea production of 110,000 bbl/d in 2011 and a further 230,000 bbl/d in 2012. Projected U.S. crude oil and liquid fuels production is flat in 2011 and then falls by 130,000 bbl/d in 2012.

**OPEC Supply.** Forecast OPEC crude oil production increases by only 0.1 million bbl/d in 2011, followed by a significantly larger 1.1 million bbl/d increase in 2012. EIA assumes that about one-half of Libya's production will resume by the end of 2012. EIA has revised its projected OPEC surplus capacity downward, compared with the last *Outlook*. EIA projects that OPEC surplus capacity will fall from 4.2 million bbl/d at the end of 2010 to 3.4 million bbl/d at the end of 2011, followed by a further decline to 2.7 million bbl/d by the end of 2012 ([OPEC Surplus Crude Oil Production Capacity Chart](#)). Forecast OPEC non-crude liquids production increases by 0.7 million bbl/d in 2011 and by 0.3 million bbl/d in 2012.

**OECD Petroleum Inventories.** EIA expects that OECD onshore inventories will decline from the elevated levels of 2010 following the steep drop in floating storage that has already occurred. Projected on-shore OECD stocks fall by about 78 million barrels in 2011, followed by an additional 43 million barrel decline in 2012. Days of supply (total inventories divided by average daily consumption) drops from a relatively high 58 days during the fourth quarter 2010 to 55.8 days in the last quarter of 2011. EIA expects that the continued increase in consumption and decline in inventories in 2012 will leave inventories at 54.6 days of supply at the end of that year ([Days of Supply of OECD Commercial Stocks Chart](#)).

**Crude Oil Prices.** WTI crude oil spot prices averaged \$89 per barrel in February then rose to \$108 per barrel by the end of March. Projected WTI prices average \$106 in 2011 and \$114 per barrel in 2012, increases of \$5 per barrel and \$9 per barrel, respectively, from last month's *Outlook* ([West Texas Intermediate Crude Oil Price Chart](#)). Growing volumes of Canadian crude oil imported into the United States contributed to record-high storage levels at Cushing, Oklahoma, and a price discount for WTI compared with similar quality world crudes such as Brent. Consequently, the projected U.S. refiner average acquisition cost of crude oil, which was about \$2.50 per barrel below WTI in 2009 and 2010, is \$2.20 per barrel above WTI in 2011 and \$0.25 per barrel above WTI in 2012.

All energy price forecasts are highly uncertain ([Energy Price Volatility and Forecast Uncertainty](#)). WTI futures for June 2011 delivery over the 5-day period ending April 7 averaged \$109 per barrel and implied volatility averaged 30 percent, establishing the lower and upper limits of a 95-percent confidence interval for the market's expectations of monthly average WTI prices in that month of \$90 per barrel and \$132 per barrel, respectively. Last year at this time, WTI for June 2010 delivery averaged

\$83 per barrel with the limits of the 95-percent confidence interval at \$68 per barrel and \$101 per barrel. Based on WTI futures and options prices, the probability that the monthly average price of WTI crude oil will exceed \$120 per barrel in December 2011 is about 32 percent. Conversely, the probability that the monthly average December 2011 WTI price will fall below \$100 per barrel is about 38 percent.

## **U.S. Crude Oil and Liquid Fuels**

**U.S. Liquid Fuels Consumption.** Total consumption of petroleum and non-petroleum liquid fuels increased by 380,000 bbl/d (2.0 percent) to 19.1 million bbl/d in 2010 ([U.S. Liquid Fuels Consumption Growth Chart](#)). Projected total U.S. liquid fuels consumption increases by 210,000 bbl/d (1.1 percent) in 2011, and by a further 160,000 bbl/d (0.9 percent), to 19.5 million bbl/d, in 2012. Transportation fuels (motor gasoline distillate fuel, and jet fuel) account for about 75 percent of the growth in total consumption in 2011 and almost all of the growth in 2012.

**U.S. Liquid Fuels Supply and Imports.** Domestic crude oil production, which increased by 150,000 bbl/d in 2010 to 5.51 million bbl/d, declines by 30,000 bbl/d in 2011 and by a further 120,000 bbl/d in 2012 ([U.S. Crude Oil Production Chart](#)). The forecast includes Alaska production declines of 60,000 bbl/d in 2011 and 10,000 bbl/d in 2012. EIA expects production from the Federal Gulf of Mexico (GOM) to fall by 190,000 bbl/d in both 2011 and 2012. The forecast production declines in Alaska and the GOM are partially offset by projected increases in lower-48 non-GOM production of 220,000 bbl/d in 2011 and 70,000 bbl/d in 2012.

Liquid fuel net imports, including both crude oil and refined products, fell from 57 percent of total U.S. consumption in 2008 to 49 percent in 2010, primarily because of the decline in consumption during the recession and rising domestic production. EIA forecasts that liquid fuel net imports will average 9.5 million bbl/d in 2011 and 9.9 million bbl/d in 2012, comprising 49 percent and 51 percent of total consumption, respectively.

## **Summer Transportation Fuels Outlook**

The continuing economic recovery tends to boost gasoline and diesel fuel consumption, while the effect of higher retail prices tends to dampen it. These counter-balancing forces are expected to be prominent features of the summer driving season, which EIA defines as April 1 through September 30.

**Prices.** EIA expects regular-grade gasoline retail prices, which averaged \$2.76 per gallon last summer, will average \$3.86 per gallon during the current driving season.

The projected monthly average regular retail gasoline price peaks this year at \$3.91 per gallon in early summer. Diesel fuel prices, which averaged \$2.98 per gallon last summer, are projected to average \$4.09 this summer. Weekly and daily national average prices can differ significantly from monthly and seasonal averages, and there are also significant differences across regions, with monthly average prices in some areas exceeding the national average price by 25 cents per gallon or more.

As in the case of crude oil, the market's expectation of uncertainty in monthly average gasoline prices is reflected in the pricing and implied volatility of futures options contracts. New York Harbor reformulated gasoline blendstock for oxygenate blending (RBOB) futures contracts for July 2011 delivery over the 5-day period ending April 7, averaged \$3.15 per gallon. The probability the RBOB futures price will exceed \$3.30 per gallon (consistent with a U.S. average regular gasoline retail price above \$4 per gallon) in July 2011 is about 33 percent.

Because taxes and retail distribution costs are generally stable, movements in gasoline and diesel prices are driven primarily by changes in crude oil prices and wholesale margins. Crude oil prices that differ from our forecast would be reflected in the price of motor fuels. Each dollar per barrel of sustained change in crude oil prices relative to the forecast translates into approximately a 2.4 cent-per-gallon change in product prices, absent the consideration of factors specific to the gasoline and diesel fuel markets.

Retail price projections reflect higher prices for the refiner acquisition cost of crude oil, expected to average \$112.50 per barrel this summer compared with last summer's average of \$74.70 per barrel. EIA expects wholesale gasoline margins (the difference between the wholesale price of gasoline and the refiner acquisition cost of crude oil) to average 53 cents per gallon this summer compared to 36 cents per gallon last summer, largely brought about by continuing strength in world-wide liquid fuels consumption. Similarly, EIA forecasts higher wholesale diesel margins this summer (60 cents per gallon) than last summer (40 cents per gallon).

The projected increase in gasoline prices suggests that vehicle fueling costs for the average U.S. household will be about \$825 higher in 2011 than they were in 2010. According to the [2009 National Household Travel Survey \(Transportation Energy Data Book\)](#), Tables 4.1 and 8.6), U.S. households drove an average 20,251 miles with an average passenger car fuel efficiency of 22.6 miles per gallon. Assuming no change in travel or average fuel economy, the increase in the average annual gasoline retail price (all grades) from \$2.40 per gallon in 2009 to \$2.83 per gallon in 2010 and a projected \$3.75 per gallon in 2011 implies an increase in average annual household expenditures on gasoline from \$2,150 in 2009 to \$2,535 in 2010 and \$3,360 in 2011.

**Motor Gasoline.** During this summer season, projected motor gasoline consumption increases by 0.5 percent over last summer. Finished motor gasoline is supplied by four sources: domestic refinery output, domestic production and net imports of fuel ethanol for gasoline blending, primary inventories, and net imports of gasoline and gasoline blending components. EIA expects that domestic refinery production will increase by 0.6 percent from last summer, in line with growth in consumption. Projected blending of fuel ethanol increases by 5 percent from last summer. Forecast total gasoline net imports are projected to decline by about 10 percent from the previous summer. Fuel ethanol blending into gasoline averaged 868,000 bbl/d during summer 2010 and EIA forecasts an average 912,000 bbl/d this summer, which is about 9.8 percent of total gasoline consumption.

At the onset of the summer driving season (April 1) total gasoline stocks, at 215.7 million barrels, are 8.3 million barrels below the level of a year-ago, but still about 1 million barrels more than the previous 5-year average for beginning-of-season stocks. ([U.S. Gasoline and Distillate Inventories Chart](#)). Stock withdrawals have not been a significant motor gasoline supply source for the summer season in recent years and are projected to average 48,000 bbl/d this summer, compared with 26,000 bbl/d last summer.

For the 2011 summer season, EIA expects net imports of motor gasoline and blending components to average 630,000 bbl/d, which is lower than the average 700,000 bbl/d seen last summer, due primarily to continued growth in domestic supplies and continuing strength in gasoline export markets.

**Diesel Fuel.** Projected distillate fuel consumption, which includes diesel fuel and heating oil, averages 3.81 million bbl/d this summer, up 2.3 percent from last summer. That growth is buoyed by continued strength in manufacturing output and foreign trade.

Distillate fuel is supplied by four sources: domestic refinery output, biodiesel blending, primary inventories, and net imports. Refinery output of distillate fuel is projected to average 4.36 million bbl/d this summer, up slightly from the 4.35 million bbl/d last summer.

Biodiesel is a small but growing part of the distillate pool. Biodiesel consumption averaged 20,000 bbl/d last summer and is expected to grow to about 46,000 bbl/d this summer, due in part to the resumption of the biodiesel tax credit..



Distillate inventories are projected to start the summer at 153.5 million barrels, up from 146.0 million barrels last year at this time and a new record for the start of the summer season. Distillate inventories typically build during the summer season in preparation for the heating season. This summer, the build is forecast to average 40,000 bbl/d, far less than the 113,000 bbl/d recorded last summer and the 5-year average summer build of 121,000 bbl/d. As a result, end-of-summer stocks are 161 million barrels, down from the record 166.7 million barrels recorded last summer, but still 11 million barrels above the previous 5-year end-of-summer average.

Continuing strong world demand for distillate fuels is forecast to contribute to continuing high U.S. net exports of distillate fuel averaging 500,000 bbl/d this summer, down slightly from 520,000 bbl/d last summer. In contrast, the United States was a net importer of distillate fuel, averaging 120,000 bbl/d during the summers of 2000 through 2007.

## Natural Gas

***U.S. Natural Gas Consumption.*** EIA expects total natural gas consumption to rise slightly from 2010 levels to 66.7 billion cubic feet per day (Bcf/d) in 2011, primarily because of the increase in consumption in the industrial sector ([U.S. Total Natural Gas Consumption Chart](#)). Forecast industrial consumption rises 3.6 percent to 18.7 Bcf/d in 2011, largely driven by the natural-gas-weighted industrial production index, which is expected to increase by 4.3 percent.

Total consumption growth increases by 0.7 percent in 2012 to 67.2 Bcf/d. Natural gas consumption in the industrial and electric power sectors grow by 1.3 percent and 2.9 percent, respectively, which offsets forecast declines in residential and commercial consumption (note, however, that consumption changes relative to 2010 are affected by changes in EIA's methodology for collecting and reporting natural gas consumption data that were implemented in the middle of 2010 to provide more accurate data on seasonal patterns of natural gas use.)

***U.S. Natural Gas Production and Imports.*** EIA expects the growth in natural gas production to slow from the 2.6 Bcf/d (4.5 percent) increase seen in 2010. Total marketed production grows 1.5 Bcf/d (2.4 percent) to 63.3 Bcf/d in 2011 and by 0.5 Bcf/d (0.8 percent) in 2012. For both 2011 and 2012, declines in Federal GOM production are more than offset by increases in production in the lower-48 states.

Marketed natural gas production in December 2010 of 64.0 Bcf/d was the highest rate since February 1973. The latest EIA data for monthly natural gas production show a decline in production in the lower-48 States for January 2011. Some of this decline is

because of “freeze-offs” during the very cold weather that forced some producers to temporarily shut down some production. Production is expected to recover from these freeze-offs before beginning modest declines that will continue through the year because of a falling gas-directed drilling rig count. The number of rigs drilling for natural gas, as reported by Baker Hughes Inc., has fallen from 973 in April 2010 to 889 as of April 8, 2011. The large price difference between petroleum liquids and natural gas on an energy-equivalent basis contributes to an expected shift towards drilling for liquids rather than for dry gas. Increasing consumption in 2012, led by strong growth in the electric power sector, contributes to higher prices and to an economic incentive for producers to resume drilling.

Growing domestic production continues to reduce U.S. reliance on natural gas imports. Pipeline gas from Canada remains the dominant source of U.S. natural gas imports. Because of the earthquake in Japan and subsequent nuclear outages, Japan’s demand for LNG as a replacement fuel for electric power generation is expected to increase, contributing to higher global LNG prices. Japan is already the largest importer of LNG in the world, with daily imports averaging more than 9 Bcf/d in 2010. EIA now projects U.S. imports of LNG will average 1.05 Bcf/d in 2011, down from 1.18 Bcf/d in 2010.

**U.S. Natural Gas Inventories.** On April 1, 2011, working natural gas in storage stood at 1,579 Bcf, slightly below last year's level at this time ([U.S. Working Natural Gas in Storage Chart](#)). Cold temperatures and production freeze-offs in January and February contributed to some relatively large draws on inventories despite year-over-year increases in production. EIA expects that inventories, though somewhat below their 2010 levels for the first half of the year, will remain robust.

**U.S. Natural Gas Prices.** The Henry Hub spot price averaged \$3.97 per MMBtu in March, 12 cents lower than the average price in February and 6 cents lower than the March forecast in last month’s Outlook ([Henry Hub Natural Gas Price Chart](#)). EIA expects that the Henry Hub price will average \$4.10 per MMBtu over 2011, a decline of 29 cents from 2010. However, the projected Henry Hub price rises to \$4.55 per MMBtu in 2012.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for June 2011 delivery (for the 5-day period ending April 7) averaged \$4.29 per MMBtu, and the average implied volatility over the same period was 34 percent. The lower and upper bounds for the 95-percent confidence interval for June 2011 contracts are \$3.37 per MMBtu and \$5.47 per MMBtu, respectively. At this time last year, the natural gas June 2010 futures contract averaged \$4.04 per MMBtu and implied volatility averaged 41 percent. The



corresponding lower and upper limits of the 95-percent confidence interval were \$3.00 per MMBtu and \$5.50 per MMBtu.

## Electricity

**U.S. Electricity Consumption.** EIA expects an increase of 0.2 percent in total U.S. electricity consumption during 2011 ([U.S. Total Electricity Consumption Chart](#)). Retail sales of electricity to the residential sector this year fall 1.9 percent in response to the assumed 16-percent decline in cooling degree-days compared with the hot summer of 2010. Improved economic conditions during 2011 should spur growth in sales of electricity to the commercial and industrial sectors of 1.0 percent and 2.5 percent, respectively. During 2012, total U.S. electricity consumption should grow by 2.3 percent.

**U.S. Electricity Generation.** EIA projects that total generation by the electric power sector will fall by 0.1 percent during 2011 ([U.S. Electric Power Sector Generation Growth Chart](#)). Higher-than-normal precipitation in the Pacific Northwest over the past month has led to increased hydroelectric generation, which is expected to grow by 7.3 percent during 2011. Increases in other renewable generation, especially wind power (up 19 percent during 2011), are offset by declines in coal-fired generation (down 1.8 percent) and nuclear power (down 1.6 percent). During 2012, EIA expects a 2.5-percent increase in total electric power sector generation, fueled primarily by increased coal and natural gas generation.

**U.S. Electricity Retail Prices.** During 2010, retail prices for electricity distributed to the residential sector averaged 11.58 cents per kilowatthour, about the same level as in 2009. EIA expects residential prices to rise by 2.3 percent in 2011, followed by little change in 2012 ([U.S. Residential Electricity Prices Chart](#)). The effect of lower generation fuel costs should be more evident during 2011 in retail prices for electricity distributed to the industrial sector, which EIA projects will increase by only 0.9 percent during 2011 then fall slightly, by 0.2 percent next year.

## Coal

**U.S. Coal Consumption.** EIA estimates that coal consumption in the electric power sector grew by 5 percent in 2010, primarily the result of higher electricity consumption during the hot summer. EIA projects that coal consumption in the electric power sector will decrease slightly in 2011. Forecast coal consumption in the electric power sector grows by 3.0 percent in 2012, and reaches 1 billion short tons for the first time since 2008. The electric power sector consumed an average of 1 billion short tons annually from 2003 through 2008 ([U.S. Coal Consumption Growth Chart](#)).

**U.S. Coal Supply.** Coal production in 2010 grew by only 1 percent despite the 5-percent increase in total U.S. coal consumption. A drawdown in stocks, particularly in the electric power sector, met the demand increase ([U.S. Electric Power Sector Coal Stocks Chart](#)). EIA projects that coal production will increase just slightly in 2011 as total coal consumption shows little change ([U.S. Annual Coal Production Chart](#)), followed by a 2.3-percent increase in 2012.

**U.S. Coal Trade.** Strong global demand for coal, particularly metallurgical coal used to produce steel, resulted in sharp increases in U.S. coal exports in 2010. Metallurgical coal's share of total U.S. coal exports grew from 52 percent in 2008 to 69 percent in 2010. Supply disruptions in several key coal exporting countries (Australia, Colombia, Indonesia, and South Africa) have greatly affected the amount of coal available on the world market. Consequently, EIA expects U.S. coal exports to increase by 7.3 percent to 88 million short tons in 2011. Forecast U.S. coal exports fall back to more typical historical levels (about 80 million short tons) in 2012 as supply from other major coal-exporting countries recovers.

The strong global demand for coal outside the U.S., also contributed to a 14.5 percent decline in U.S. coal imports in 2010 (to 19.4 million short tons) despite an increase in consumption. EIA expects the trend of lower U.S. coal imports to continue, with imports below 19 million short tons in 2011 and 2012. U.S. coal imports averaged about 31 million short tons annually from 2004 through 2009.

**U.S. Coal Prices.** Electric power sector coal prices have been rising relatively steadily over the last 10 years, reflecting longer-term coal contracts initiated during a period of high energy prices, rising transportation costs, and increased consumption. However, EIA expects that the power sector coal price will remain stable in 2011 and 2012 as coal competes with natural gas for market share. The projected power sector delivered coal price, which averaged \$2.26 per MMBtu in 2010, averages \$2.30 per MMBtu and \$2.27 per MMBtu in 2011 and 2012, respectively.

## **U.S. Carbon Dioxide Emissions**

EIA estimates that fossil-fuel CO<sub>2</sub> emissions increased by 3.7 percent in 2010 ([U.S. Carbon Dioxide Emissions Growth Chart](#)). Coal- and natural gas-related CO<sub>2</sub> emissions rose as a result of increased usage of both fuels for electricity generation and higher consumption of natural gas in the industrial sector.

Forecast fossil-fuel CO<sub>2</sub> emissions remain relatively flat in 2011. Projected increases in petroleum consumption and natural gas consumption in the industrial sector are

offset by declines in natural gas consumption in both the residential and commercial sectors. Expected increases in electricity generation and the improvement in economic growth in 2012 contribute to a 1.8-percent increase in fossil-fuel CO<sub>2</sub> emissions.